

The slide features a dark background with a large, vibrant explosion of multi-colored lines (blue, red, yellow, and white) radiating from the center. On the left side, there is a vertical bar composed of several parallel yellow and orange stripes.

Intelligent Asset Management

Physics based Digital Twins

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VISIT...

LANZAROTE
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Strong Momentum for Intelligent Asset Management

Digital readiness surveys show that companies clearly see the need to leverage the digital capabilities to optimize their asset management:



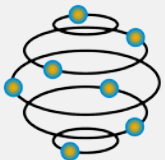
76%

of organizations consider it important to **predict potential failures** by leveraging data models



21%

Only 21% of organizations employ **predictive and preventive maintenance** effectively



83%

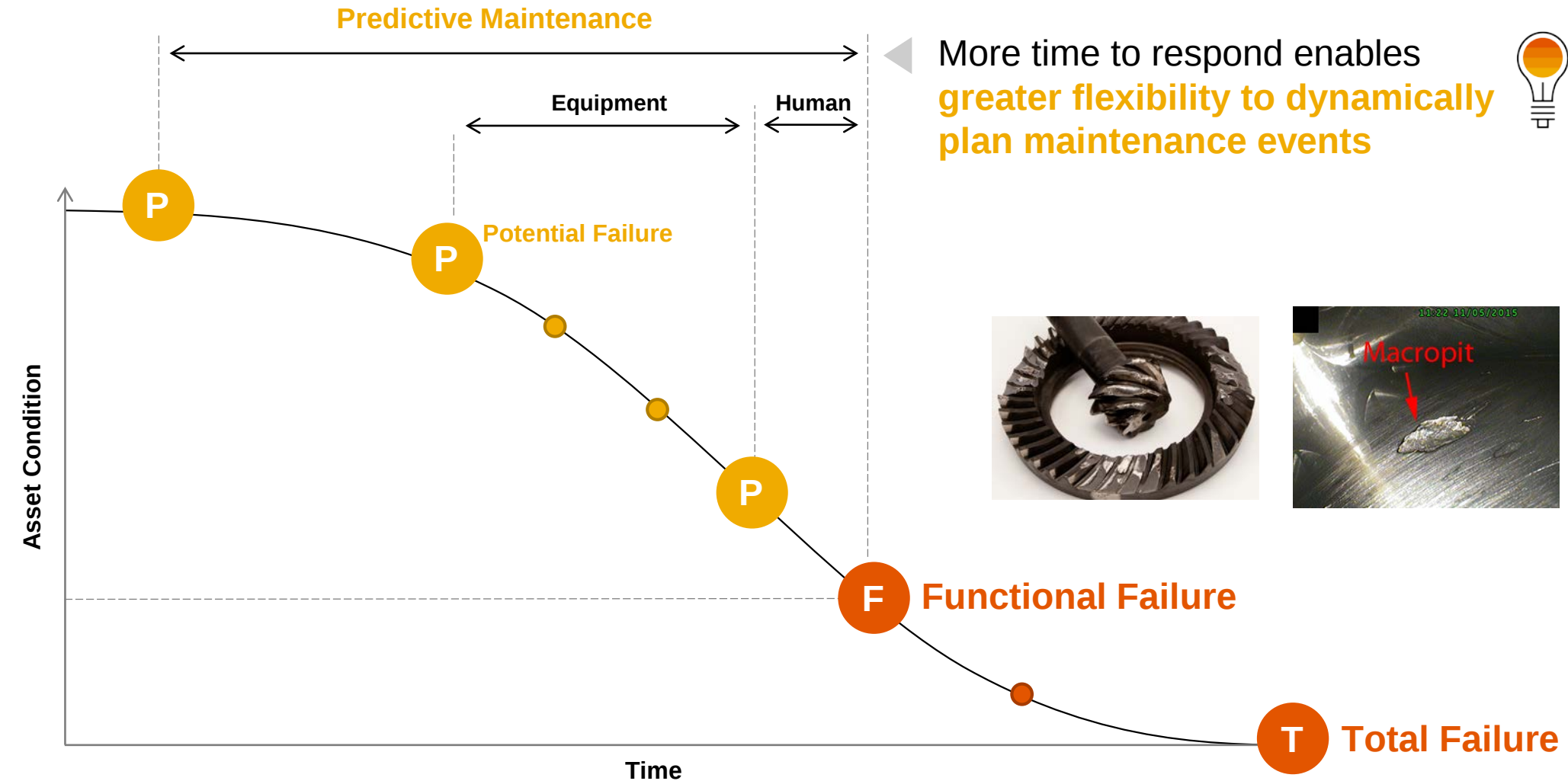
of organizations consider it important to run **real-time asset management processes**



13%

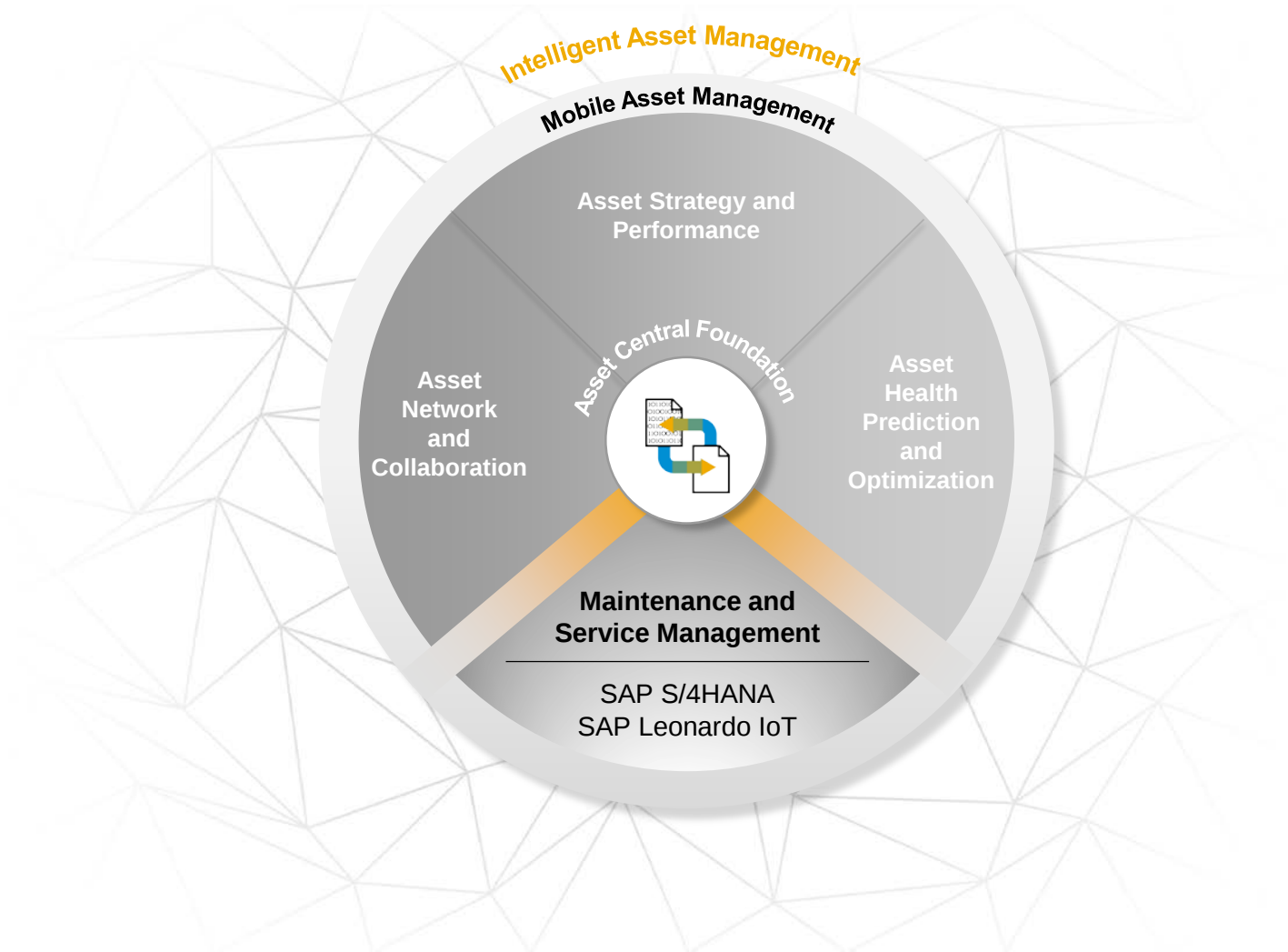
Only 13% of organizations are able to drive asset performance based on **analysis of real-time sensor data, along with historical maintenance data**

Motivation – Intelligent Asset Management



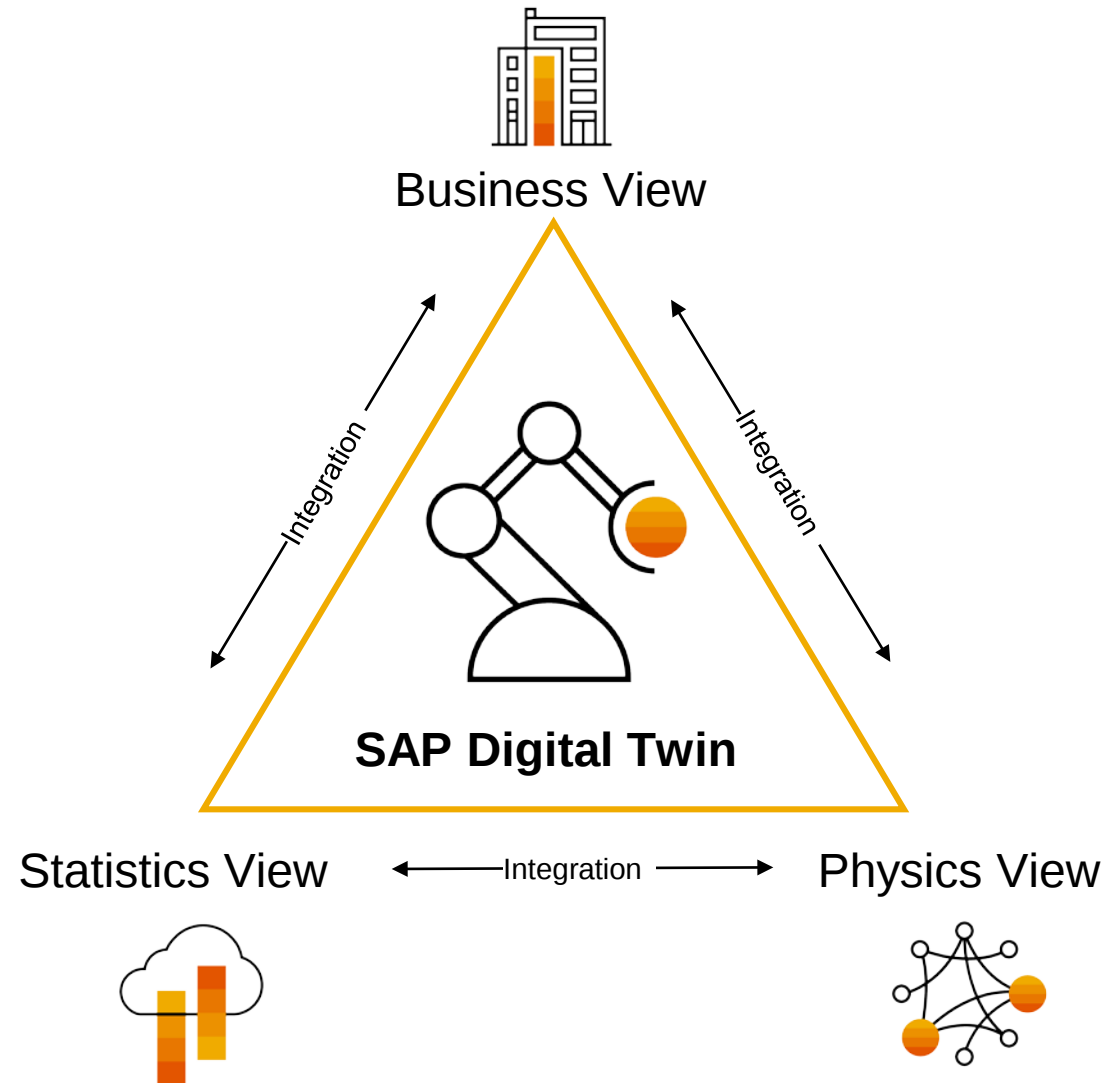
SAP Enterprise Asset Management

Intelligent Asset Management



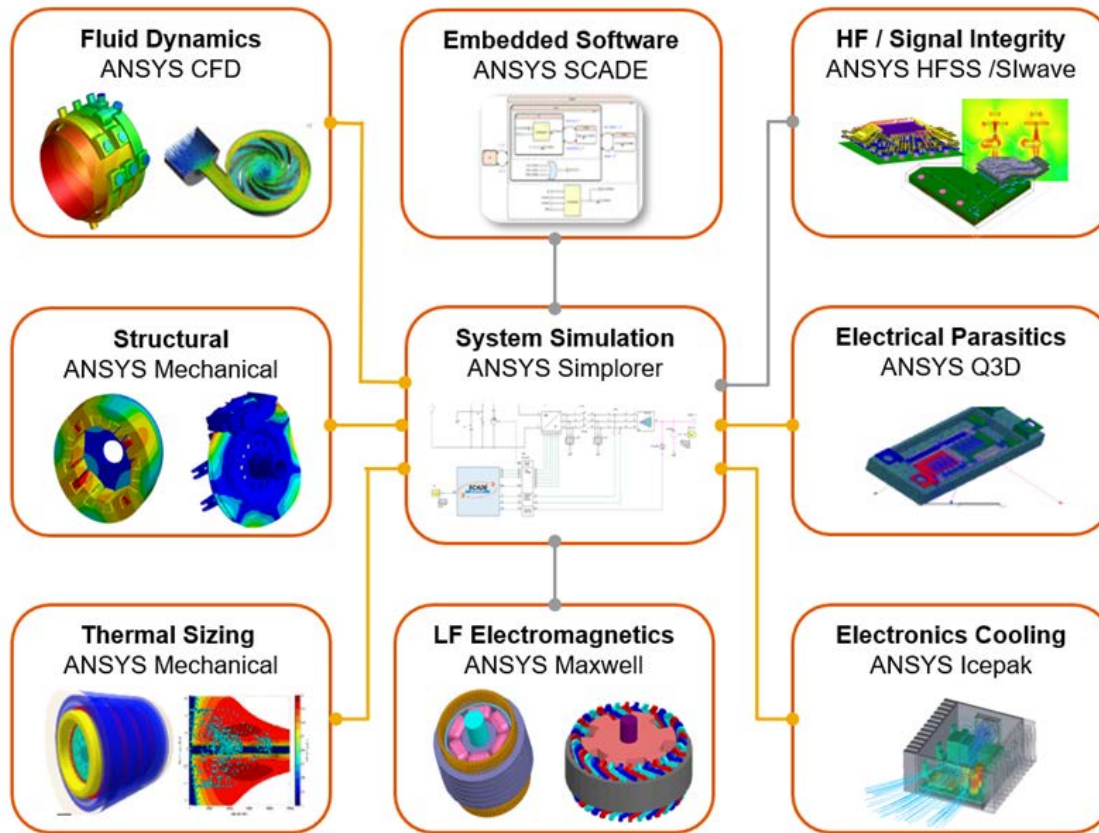
SAP Intelligent Asset Management

Asset Health Prediction and Optimization



SAP Intelligent Asset Management

Asset Health Prediction and Optimization



Sensor Data



Simulation-based Digital Twins

Leverage IoT enabled **engineering simulation models** for asset health prediction and optimization based on multi-physics simulations

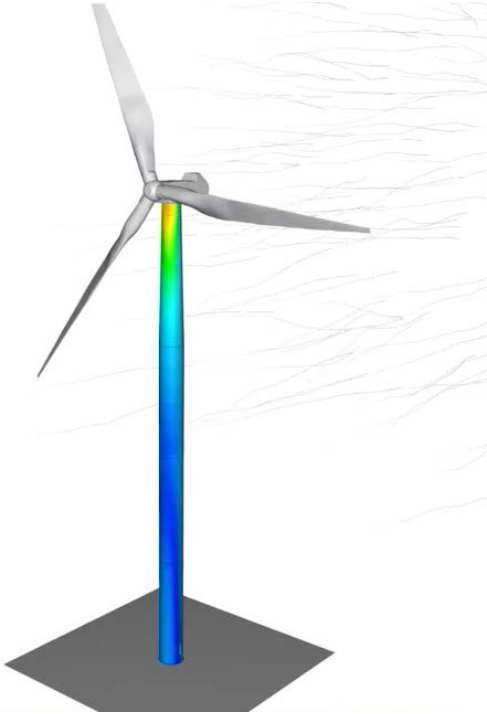
Digital Twin for Structural Dynamics



Asset Health Prediction and Optimization

Examples

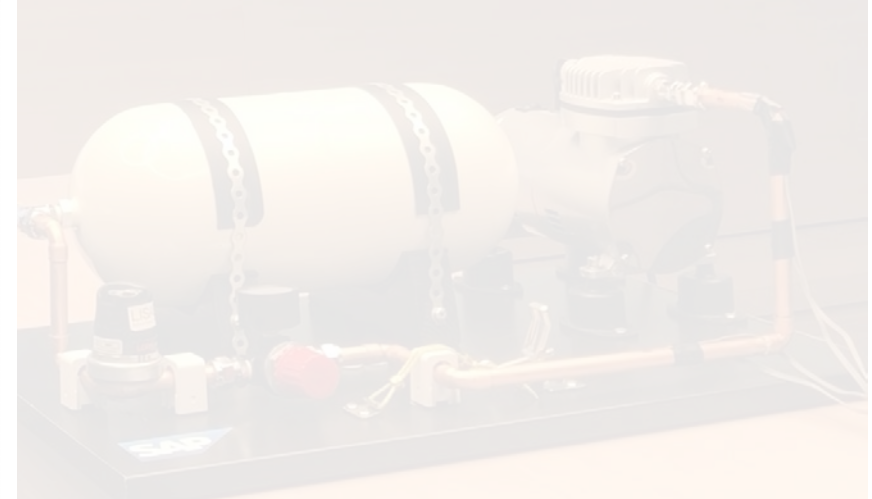
1 Wind turbines



2 Bridges



3 Vibrating equipment



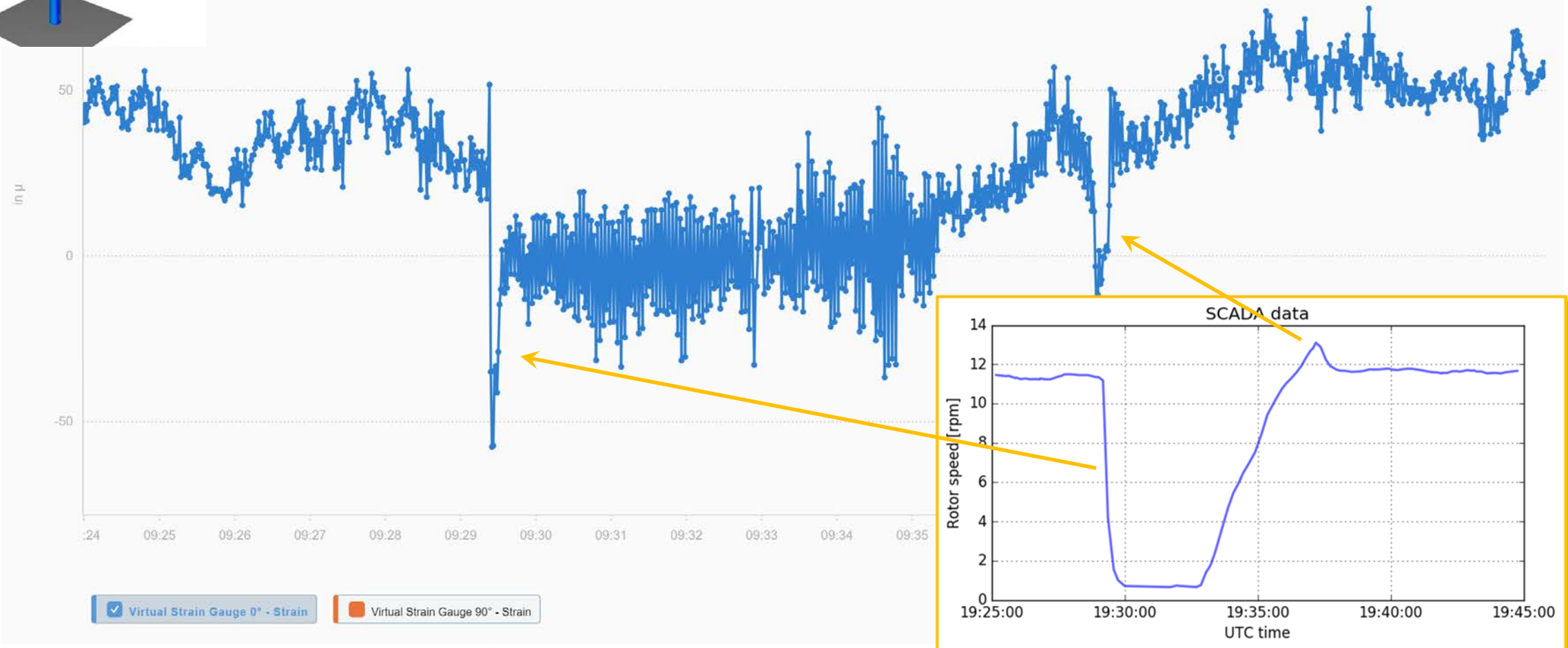


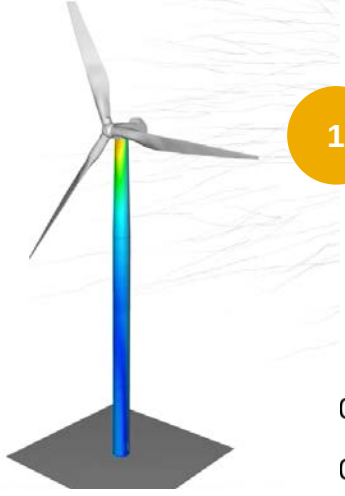
1

Examples

Extreme loads from rapid changes in state

Production > stop > production



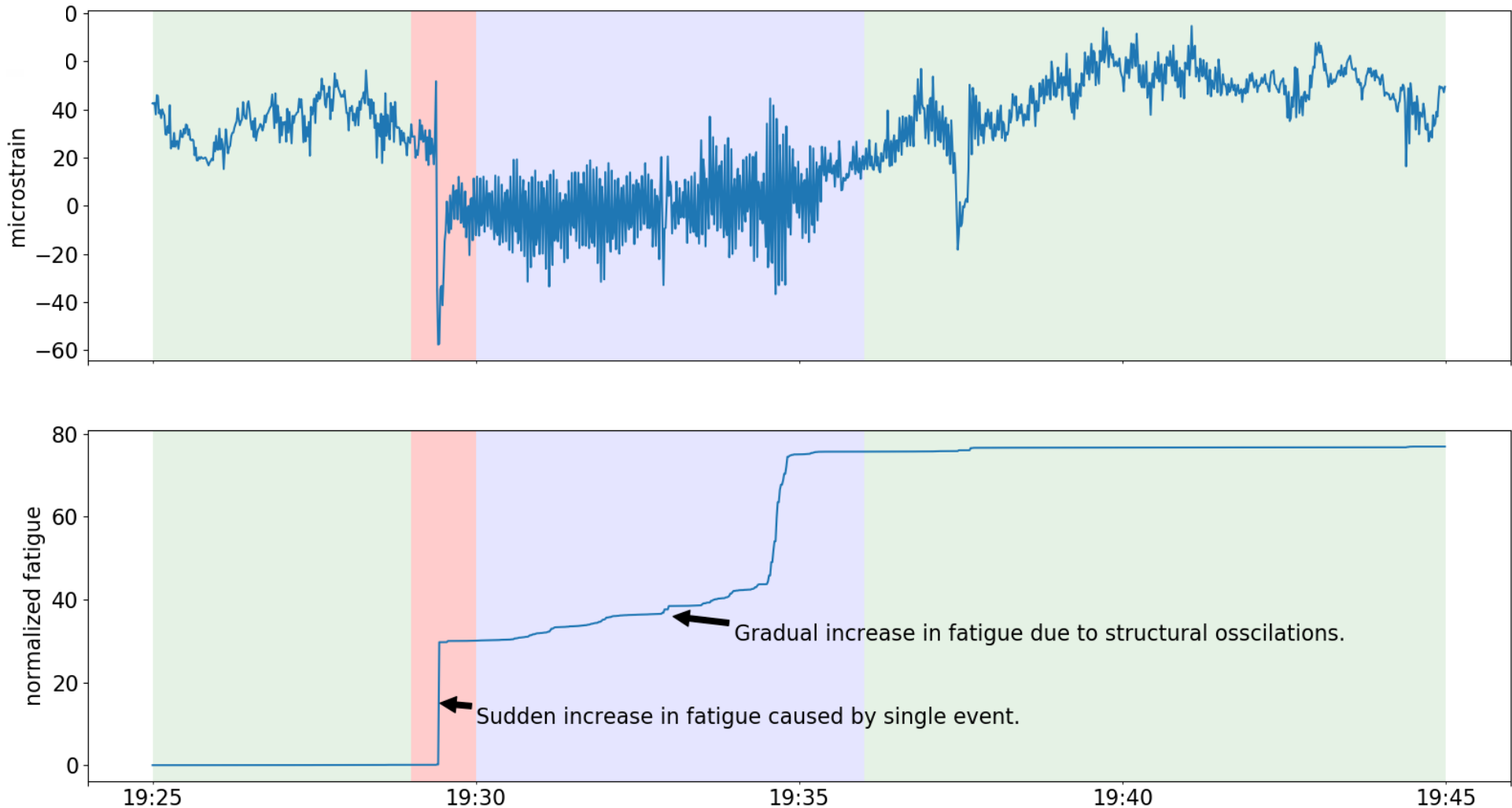


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Examples

One radical happening “eats” 4 days normal life

Virtual strain gauge 1 (tower bottom), 2018-06-04, UTC



Asset Health Prediction and Optimization

Examples

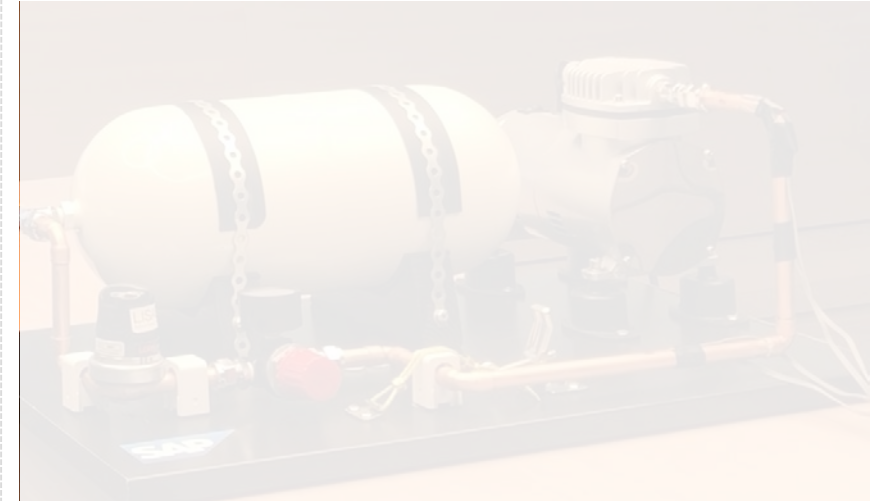
1 Wind turbines



2 Bridges



3 Vibrating equipment



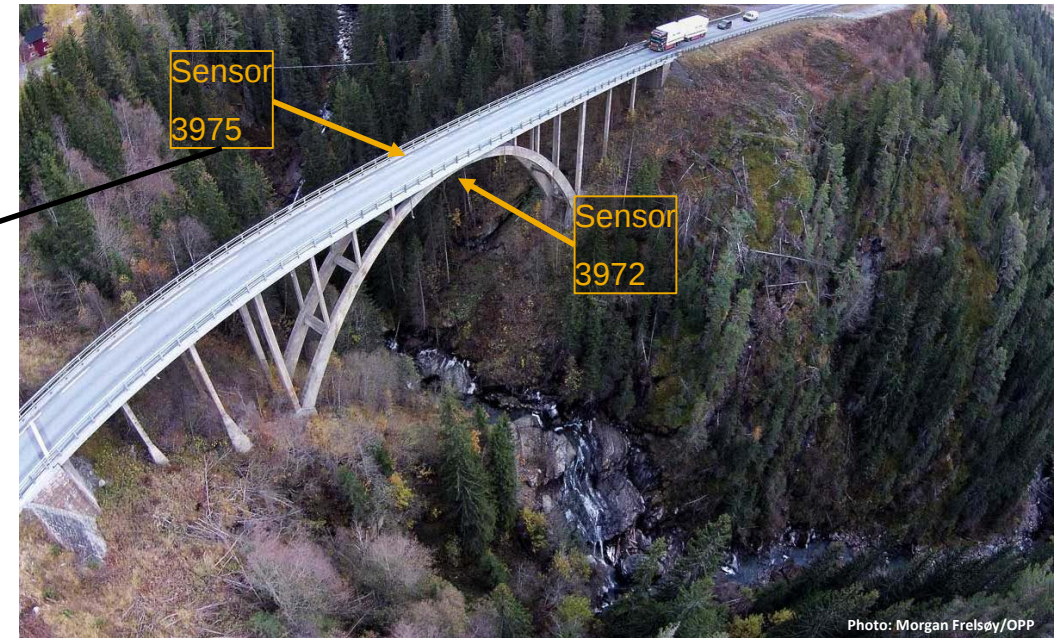
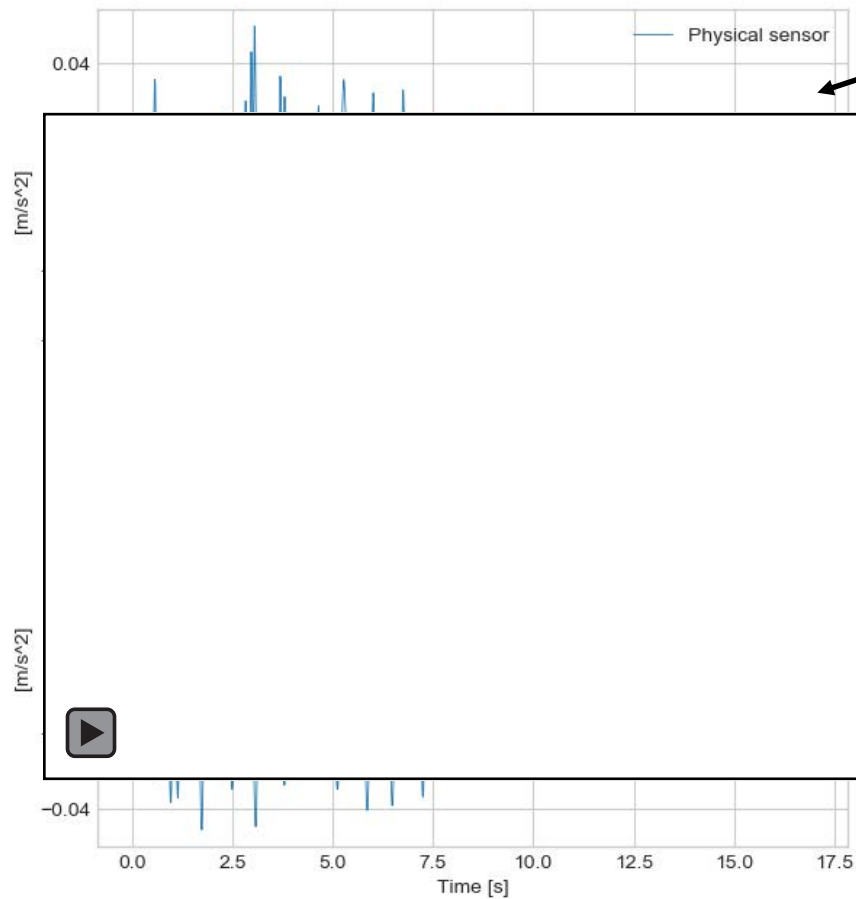
2 Example bridges

Global structural deterioration



2 Example bridges

Global structural deterioration



Asset Health Prediction and Optimization

Examples

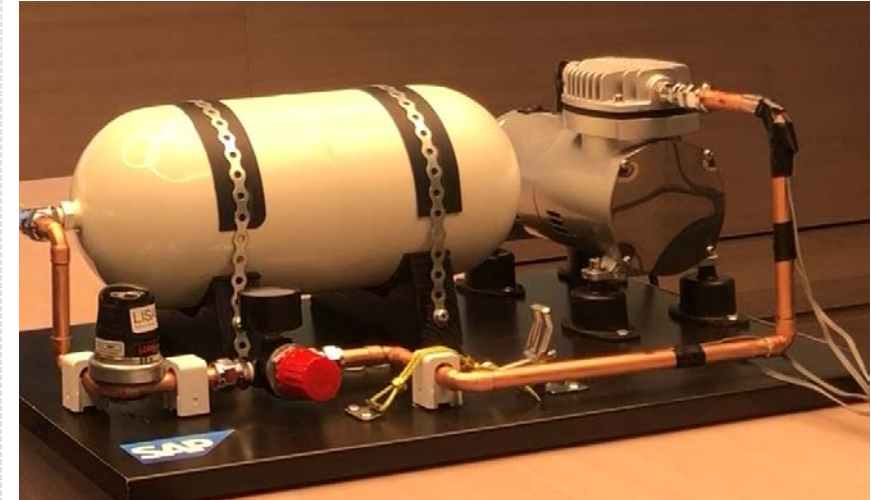
1 Wind turbines

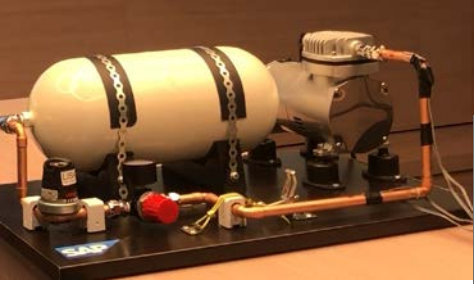


2 Bridges



3 Vibrating equipment





3

Example Vibrating Equipment

SAP Intelligent Asset Management

Asset Health Prediction and Optimization

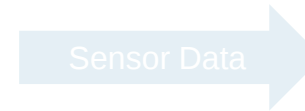


75 78 82 79



Data Science

Use **machine learning** to provide advanced notice of a failure to reduce the number of unplanned downtime maintenance



75 78 82 79



Simulation-based Digital Twins

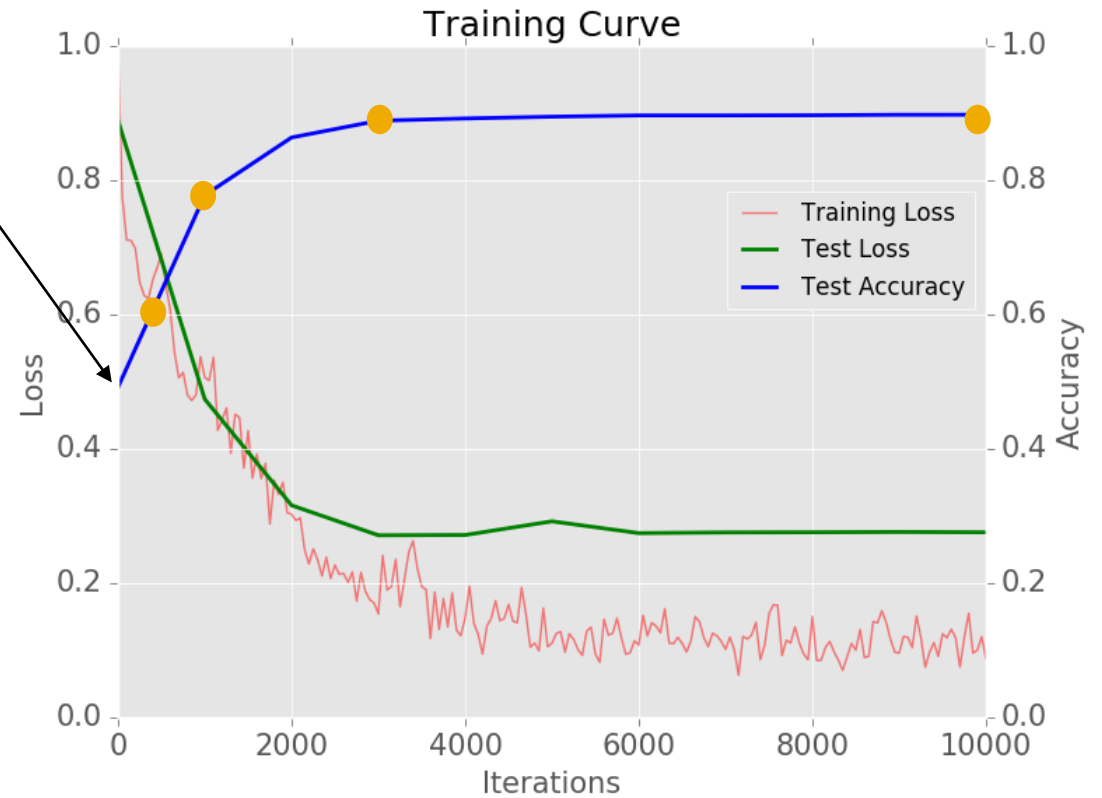
Leverage IoT enabled **engineering simulation models** for asset health prediction and optimization based on multi-physics simulations

Machine Learning/Teaching

Starting point: 50/50



Sample of cats & dogs images from Kaggle Dataset



<http://adilmoujahid.com/posts/2016/06/introduction-deep-learning-python-caffe/>

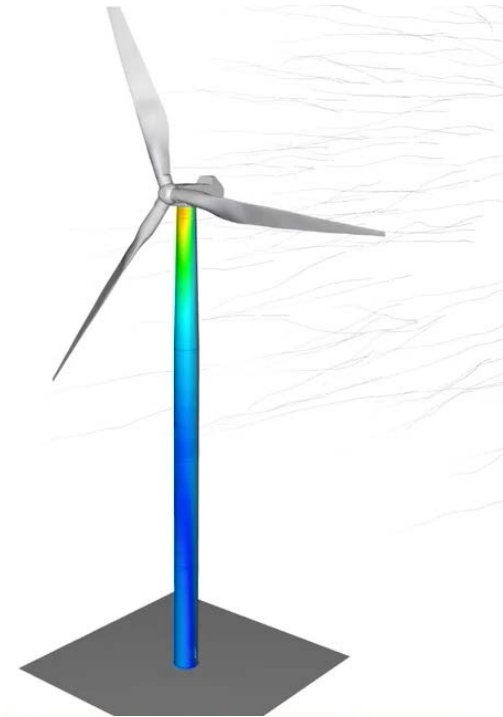
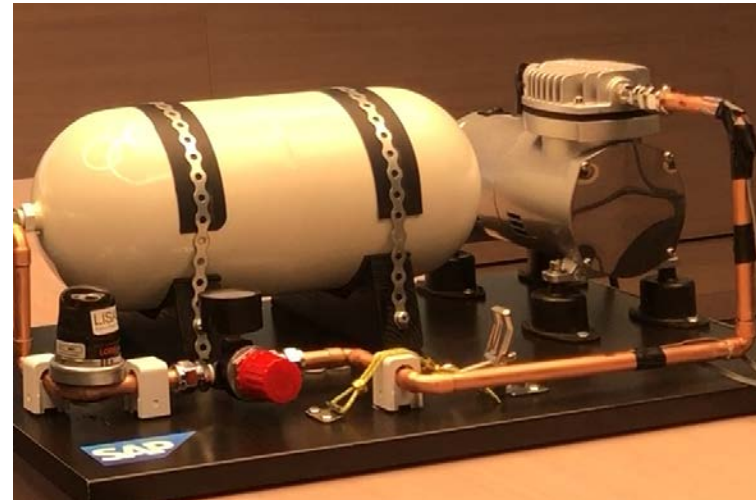
SAP Digital Twin and Machine Learning

Machine Learning in industrial application is used to determine «normal vs irregular»

WHAT IS NORMAL?

- The laws of physics are constant (=Normal?!)

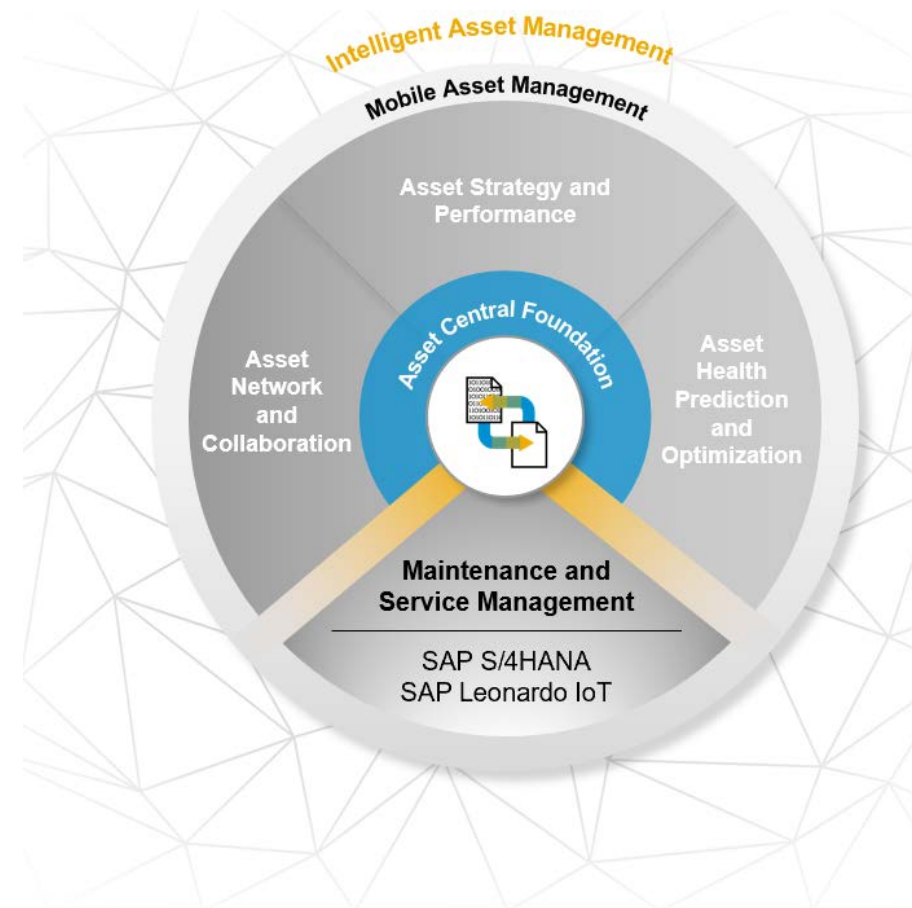
SAP Digital Twin can be used to train the Machine Learning Algorithms



Intelligent Asset Management

Advantages

- **Continuous** versus campagne
- Integrated platform in one core SAP system. No stand-alone measuring system
- **Real time** asset behaviour
- **Integrate maintainance, inspection, risk matrix** and geographical overlay
- Based on the need for prediction; simulations using **sensor data** or the **Digital Twin models can predict global behaviour**



Thank you.

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